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|---|---|
| THANGAVELU, KANDASAMY | |
| ART UNIT | PAPER NUMBER |
| 2123 | |

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Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/762,396 | HEILENBACH ET AL. | |
| | Examiner | Art Unit | |
| | Kandasamy Thangavelu | 2123 | |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --***

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on 22 January 2004.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-20 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 22 January 2004 is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

1. Claims 1-20 of the application have been examined.

### *Drawings*

2. The drawings submitted on January 22, 2004 are accepted.

### *Claim Rejections - 35 USC § 112*

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 2, 14 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 states in part, "a data coincidence of said at least one data coincidence comprises a predetermined range of proximity of each of said rotation speed of a throttle setting, said at least one natural frequency, and said turbine vane nozzle excitation". The statements "a data coincidence of said at least one data coincidence" and "proximity of each of said rotation speed of a throttle setting, said at least one natural frequency, and said turbine vane nozzle excitation" are not understood.

Claim 14 states in part, "a data coincidence of said at least one data coincidence comprises a predetermined range of proximity of each of said rotation speed of a throttle setting, said at least one natural frequency, and said turbine vane nozzle excitation". The statements "a data coincidence of said at least one data coincidence" and "proximity of each of said rotation speed of a throttle setting, said at least one natural frequency, and said turbine vane nozzle excitation" are not understood.

Claim 17 states in part, "a data coincidence of said at least one data coincidence comprises a predetermined range of proximity of each of said rotation speed of a throttle setting, said at least one natural frequency, and said turbine vane nozzle excitation". The statements "a data coincidence of said at least one data coincidence" and "proximity of each of said rotation speed of a throttle setting, said at least one natural frequency, and said turbine vane nozzle excitation" are not understood.

## *Claim Rejections - 35 USC § 103*

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

6. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

7. Claims 1-9 and 13-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Garrett et al.** (U.S. Patent Application 2004/0101402) in view of **Rowe et al.** (U.S. Patent 5,887,419), and further in view of **Kaneko et al.** ("Reduction of vibratory stress of compressor blade by use of asymmetric vane spacing", Proceedings of the International Turbine Congress, November 2003).

7.1 **Garrett et al.** teaches a turbine of a type suitable for use in a turbocharger for an internal combustion engine. Specifically, as per claim 1, **Garrett et al.** teaches a method for fabrication of a locomotive diesel engine turbocharger turbine stage (Page 1, Para 0001 and Para 0002; Figs. 1a, 1b, 1c, 2a, 2b, 2c and 3).

**Garrett et al.** does not expressly teach selecting throttle settings for the engine, wherein the selected throttle settings correlate to discrete rotation speeds of the turbocharger. **Rowe et al.** teaches throttle settings for the engine, wherein the selected throttle settings correlate to discrete rotation speeds of the turbocharger (CL4, L58 to CL5, L4; Fig. 2; CL5, L49-57). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the method of **Garrett et al.** with the method of **Rowe et al.** that included throttle settings for the engine, wherein the selected throttle settings correlate to discrete rotation speeds of the

turbocharger, because that would provide a control system to ensure that there was sufficient combustion gas flow to the engine to ensure the overall engine power output that was consistent with the throttle setting (Abstract, L3-7).

**Garrett et al.** teaches a turbocharger for the engine, including a turbine stage thereof, the turbine stage further comprising turbine blades of a turbine wheel and turbine nozzle vanes (Page 1, Para 0001 and Para 0002). **Garrett et al.** and **Rowe et al.** do not expressly teach modeling a turbocharger for the engine, including modeling of a turbine stage thereof, the modeling of the turbine stage further comprising modeling of turbine blades of a turbine wheel and modeling turbine nozzle vanes. **Kaneko et al.** teaches modeling a turbocharger for the engine, including modeling of a turbine stage thereof, the modeling of the turbine stage further comprising modeling of turbine blades of a turbine wheel and modeling turbine nozzle vanes (Abstract, L7-12; Page 1, CL1, Para 2, L1-10; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the method of **Garrett et al.** and **Rowe et al.** with the method of **Kaneko et al.** that included modeling a turbocharger for the engine, including modeling of a turbine stage thereof, the modeling of the turbine stage further comprising modeling of turbine blades of a turbine wheel and modeling turbine nozzle vanes, because in a multi-stage turbo-machinery, the interaction between the vane and the blade generates excitation force in the blade; the fundamental frequency of the excitation is a function of the rotor speed and the vane count; if the natural frequency of the blade is coincident with the excitation frequency, the resonant stress of the blade might become very large, causing blade failure; therefore, it would be necessary to analyze the resonant response of the blades and predict the vibratory stress of the blade and

identify the methods to reduce the probability of failure (Page 1, CL1, Para 2, L1-12 and Para 1, L3-12).

**Garrett et al.** and **Rowe et al.** do not expressly teach determining at least one natural vibration frequency of the turbine blades; and determining a turbine nozzle vane excitation frequency as a function of turbocharger rotation speed. **Kaneko et al.** teaches determining at least one natural vibration frequency of the turbine blades; and determining a turbine nozzle vane excitation frequency as a function of turbocharger rotation speed (Page 1, CL1, Para 2, L1-10; Page 2, CL1, Para 2 to Page 3, CL1, Para 4).

**Garrett et al.** and **Rowe et al.** do not expressly teach ascertaining whether at least one data coincidence is present, the ascertaining comprising determining whether, at a rotation speed of a throttle setting, there is a data coincidence of the at least one natural frequency and the turbine vane nozzle excitation. **Kaneko et al.** teaches ascertaining whether at least one data coincidence is present, the ascertaining comprising determining whether, at a rotation speed of a throttle setting, there is a data coincidence of the at least one natural frequency and the turbine vane nozzle excitation (Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

**Garrett et al.** teaches a turbine stage fabricated having turbine blades which are at least substantially free of harmonically resonant vibration at the discrete rotation speeds of the turbocharger (Page 1, Para 0007, Para 0009 and Para 0010; Page 2, Para 0023, L1-17; Para 0024, L14-22). **Garrett et al.** and **Rowe et al.** do not expressly teach that if there is an absence of any the data coincidence, a turbine stage fabricated according to the modeling will have turbine blades which are at least substantially free of harmonically resonant vibration at the discrete rotation speeds of the turbocharger. **Kaneko et al.** teaches that if there is an absence of any the data

coincidence, a turbine stage fabricated according to the modeling will have turbine blades which are at least substantially free of harmonically resonant vibration at the discrete rotation speeds of the turbocharger (Abstract, L7-15; Page 1, CL1, Para 2, L1-10; Page 1, CL1, Para 3, L1-5; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

7.2 As per Claim 2, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 1. **Garrett et al.** and **Kaneko et al.** do not expressly teach that a data coincidence of the at least one data coincidence comprises a predetermined range of proximity of each of the rotation speed of a throttle setting. **Rowe et al.** teaches that a data coincidence of the at least one data coincidence comprises a predetermined range of proximity of each of the rotation speed of a throttle setting (CL4, L58 to CL5, L4; Fig. 2; CL5, L49-57).

**Garrett et al.** and **Rowe et al.** do not expressly teach that a data coincidence of the at least one data coincidence comprises a predetermined range of proximity of the at least one natural frequency, and the turbine vane nozzle excitation. **Kaneko et al.** teaches that a data coincidence of the at least one data coincidence comprises a predetermined range of proximity of the at least one natural frequency, and the turbine vane nozzle excitation (Page 1, CL1, Para 2, L1-10; Page 2, CL1, Para 2 to Page 3, CL1, Para 4).

7.3 As per Claim 3, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 1. **Garrett et al.** teaches fabricating the turbocharger, wherein the turbocharger is free of any the data coincidence (Page 1, Para 0007, Para 0009 and Para 0010; Page 2, Para 0023, L1-17; Para 0024, L14-22). **Garrett et al.** and **Rowe et al.** do not expressly teach fabricating the

turbocharger according to the step of modeling, wherein the step of modeling is free of any the data coincidence. **Kaneko et al.** teaches fabricating the turbocharger according to the step of modeling, wherein the step of modeling is free of any the data coincidence (Abstract, L7-15; Page 1, CL1, Para 2, L1-10; Page 1, CL1, Para 3, L1-5; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

7.4 As per Claim 4, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 3. **Garrett et al., Rowe et al.** and **Kaneko et al.** teach a turbocharger fabricated according to the method of Claim 3. **Garrett et al.** teaches fabricating the turbocharger, wherein the turbocharger is free of any the data coincidence (Page 1, Para 0007, Para 0009 and Para 0010; Page 2, Para 0023, L1-17; Para 0024, L14-22). **Garrett et al.** and **Rowe et al.** do not expressly teach fabricating the turbocharger according to the step of modeling, wherein the step of modeling is free of any the data coincidence. **Kaneko et al.** teaches fabricating the turbocharger according to the step of modeling, wherein the step of modeling is free of any the data coincidence (Abstract, L7-15; Page 1, CL1, Para 2, L1-10; Page 1, CL1, Para 3, L1-5; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

7.5 As per Claim 5, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 2. **Garrett et al.** and **Rowe et al.** do not expressly teach repeating the step of modeling, the first and second steps of determining, and the step of ascertaining until the absence of any data coincidence is obtained; wherein the repeating of the step of modeling comprises at least one of remodeling the turbine blades and remodeling the turbine nozzle vanes. **Kaneko et al.** teaches

repeating the step of modeling, the first and second steps of determining, and the step of ascertaining until the absence of any data coincidence is obtained; wherein the repeating of the step of modeling comprises at least one of remodeling the turbine blades and remodeling the turbine nozzle vanes (Abstract, L7-12; Page 1, CL1, Para 2, L1-10; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

7.6 As per claim 6, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 5. **Garrett et al.** teaches at least one of configuration and material composition of the turbine blades (Page 1, Para 0007, Para 0009 and Para 0010; Page 2, Para 0023, L1-17; Para 0024, L14-22). **Garrett et al.** and **Rowe et al.** do not expressly teach the remodeling of the turbine blades comprises remodeling at least one of configuration and material composition of the turbine blades. **Kaneko et al.** teaches the remodeling of the turbine blades comprises remodeling at least one of configuration and material composition of the turbine blades (Abstract, L7-15; Page 1, CL1, Para 2, L1-10; Page 1, CL1, Para 3, L1-5; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

7.7 As per Claim 7, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 6. **Garrett et al.** teaches fabricating the turbocharger (Page 1, Para 0007, Para 0009 and Para 0010; Page 2, Para 0023, L1-17; Para 0024, L14-22). **Garrett et al.** and **Rowe et al.** do not expressly teach comprising fabricating a turbocharger according to the repeating of the step of modeling. **Kaneko et al.** teaches comprising fabricating a turbocharger according to the repeating of the step of modeling (Abstract, L7-15; Page 1, CL1, Para 2, L1-10; Page 1, CL1,

Para 3, L1-5; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

7.8 As per Claim 8, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 7. **Garrett et al., Rowe et al.** and **Kaneko et al.** teach a turbocharger fabricated according to the method of Claim 7. **Garrett et al.** teaches fabricating the turbocharger (Page 1, Para 0007, Para 0009 and Para 0010; Page 2, Para 0023, L1-17; Para 0024, L14-22). **Garrett et al.** and **Rowe et al.** do not expressly teach fabricating the turbocharger according to the step of modeling. **Kaneko et al.** teaches fabricating the turbocharger according to the step of modeling (Abstract, L7-15; Page 1, CL1, Para 2, L1-10; Page 1, CL1, Para 3, L1-5; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

7.9 As per Claim 9, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 5. **Garrett et al.** and **Rowe et al.** do not expressly teach the step of modeling provides a number of the turbine nozzle vanes; further wherein the remodeling of the turbine nozzle vanes comprises changing the number of the turbine nozzle vanes. **Kaneko et al.** teaches the step of modeling provides a number of the turbine nozzle vanes; further wherein the remodeling of the turbine nozzle vanes comprises changing the number of the turbine nozzle vanes (Page 1, CL1, Para 2, L13-14; Page 1, CL2, Para 3, L8-9; Page 1, CL2, Para 5, L1-4).

7.10 As per Claim 13, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 1. **Garrett et al.** and **Kaneko et al.** do not expressly teach repeating the step of selecting

the throttle settings, wherein at least one new throttle setting is selected. **Rowe et al.** teaches repeating the step of selecting the throttle settings, wherein at least one new throttle setting is selected (CL4, L58 to CL5, L4; Fig. 2; CL5, L49-57).

**Garrett et al.** and **Rowe et al.** do not expressly teach ascertaining there is an absence of any the data coincidence. **Kaneko et al.** teaches ascertaining there is an absence of any the data coincidence (Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

7.11 As per Claim 14, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 13. **Garrett et al.** and **Kaneko et al.** do not expressly teach that a data coincidence of the at least one data coincidence comprises a predetermined range of proximity of each of the rotation speed of a throttle setting. **Rowe et al.** teaches that a data coincidence of the at least one data coincidence comprises a predetermined range of proximity of each of the rotation speed of a throttle setting (CL4, L58 to CL5, L4; Fig. 2; CL5, L49-57).

**Garrett et al.** and **Rowe et al.** do not expressly teach that a data coincidence of the at least one data coincidence comprises a predetermined range of proximity of the at least one natural frequency, and the turbine vane nozzle excitation. **Kaneko et al.** teaches that a data coincidence of the at least one data coincidence comprises a predetermined range of proximity of the at least one natural frequency, and the turbine vane nozzle excitation (Page 1, CL1, Para 2, L1-10; Page 2, CL1, Para 2 to Page 3, CL1, Para 4).

7.12 As per Claim 15, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 14. **Garrett et al.** teaches fabricating the turbocharger (Page 1, Para 0007, Para 0009 and

Para 0010; Page 2, Para 0023, L1-17; Para 0024, L14-22). **Garrett et al.** and **Rowe et al.** do not expressly teach comprising fabricating a turbocharger according to the repeating of the step of modeling. **Kaneko et al.** teaches comprising fabricating a turbocharger according to the repeating of the step of modeling (Abstract, L7-15; Page 1, CL1, Para 2, L1-10; Page 1, CL1, Para 3, L1-5; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

7.13 As per Claim 16, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 15. **Garrett et al., Rowe et al.** and **Kaneko et al.** teach a turbocharger fabricated according to the method of Claim 15. **Garrett et al.** teaches fabricating the turbocharger (Page 1, Para 0007, Para 0009 and Para 0010; Page 2, Para 0023, L1-17; Para 0024, L14-22). **Garrett et al.** and **Rowe et al.** do not expressly teach fabricating the turbocharger according to the step of modeling. **Kaneko et al.** teaches fabricating the turbocharger according to the step of modeling (Abstract, L7-15; Page 1, CL1, Para 2, L1-10; Page 1, CL1, Para 3, L1-5; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

7.14 As per claim 17, **Garrett et al.** teaches a method for fabrication of a locomotive diesel engine turbocharger turbine stage (Page 1, Para 0001 and Para 0002; Figs. 1a, 1b, 1c, 2a, 2b, 2c and 3).

**Garrett et al.** does not expressly teach selecting throttle settings for the engine, wherein the selected throttle settings correlate to discrete rotation speeds of the turbocharger. **Rowe et al.**

teaches throttle settings for the engine, wherein the selected throttle settings correlate to discrete rotation speeds of the turbocharger (CL4, L58 to CL5, L4; Fig. 2; CL5, L49-57).

**Garrett et al.** teaches a turbocharger for the engine, including a turbine stage thereof, the turbine stage further comprising turbine blades of a turbine wheel and turbine nozzle vanes (Page 1, Para 0001 and Para 0002). **Garrett et al.** and **Rowe et al.** do not expressly teach modeling a turbocharger for the engine, including modeling of a turbine stage thereof, the modeling of the turbine stage further comprising modeling of turbine blades of a turbine wheel and modeling turbine nozzle vanes. **Kaneko et al.** teaches modeling a turbocharger for the engine, including modeling of a turbine stage thereof, the modeling of the turbine stage further comprising modeling of turbine blades of a turbine wheel and modeling turbine nozzle vanes (Abstract, L7-12; Page 1, CL1, Para 2, L1-10; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

**Garrett et al.** and **Rowe et al.** do not expressly teach determining at least one natural vibration frequency of the turbine blades; and determining a turbine nozzle vane excitation frequency as a function of turbocharger rotation speed. **Kaneko et al.** teaches determining at least one natural vibration frequency of the turbine blades; and determining a turbine nozzle vane excitation frequency as a function of turbocharger rotation speed (Page 1, CL1, Para 2, L1-10; Page 2, CL1, Para 2 to Page 3, CL1, Para 4).

**Garrett et al.** and **Rowe et al.** do not expressly teach ascertaining whether at least one data coincidence is present, the ascertaining comprising determining whether, at a rotation speed of a throttle setting, there is a data coincidence of the at least one natural frequency and the turbine vane nozzle excitation. **Kaneko et al.** teaches ascertaining whether at least one data coincidence is

present, the ascertaining comprising determining whether, at a rotation speed of a throttle setting, there is a data coincidence of the at least one natural frequency and the turbine vane nozzle excitation (Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

**Garrett et al.** and **Kaneko et al.** do not expressly teach that a data coincidence of the at least one data coincidence comprises a predetermined range of proximity of each of the rotation speed of a throttle setting. **Rowe et al.** teaches that a data coincidence of the at least one data coincidence comprises a predetermined range of proximity of each of the rotation speed of a throttle setting (CL4, L58 to CL5, L4; Fig. 2; CL5, L49-57).

**Garrett et al.** and **Rowe et al.** do not expressly teach that a data coincidence of the at least one data coincidence comprises a predetermined range of proximity of the at least one natural frequency, and the turbine vane nozzle excitation. **Kaneko et al.** teaches that a data coincidence of the at least one data coincidence comprises a predetermined range of proximity of the at least one natural frequency, and the turbine vane nozzle excitation (Page 1, CL1, Para 2, L1-10; Page 2, CL1, Para 2 to Page 3, CL1, Para 4).

**Garrett et al.** and **Rowe et al.** do not expressly teach repeating the step of modeling, the first and second steps of determining, and the step of ascertaining until the absence of any data coincidence is obtained; wherein the repeating of the step of modeling comprises at least one of remodeling the turbine blades and remodeling the turbine nozzle vanes. **Kaneko et al.** teaches repeating the step of modeling, the first and second steps of determining, and the step of ascertaining until the absence of any data coincidence is obtained; wherein the repeating of the step of modeling comprises at least one of remodeling the turbine blades and remodeling the

turbine nozzle vanes (Abstract, L7-12; Page 1, CL1, Para 2, L1-10; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

**Garrett et al.** teaches a turbine stage fabricated having turbine blades which are at least substantially free of harmonically resonant vibration at the discrete rotation speeds of the turbocharger (Page 1, Para 0007, Para 0009 and Para 0010; Page 2, Para 0023, L1-17; Para 0024, L14-22). **Garrett et al.** and **Rowe et al.** do not expressly teach that if there is an absence of any the data coincidence, a turbine stage fabricated according to the modeling will have turbine blades which are at least substantially free of harmonically resonant vibration at the discrete rotation speeds of the turbocharger. **Kaneko et al.** teaches that if there is an absence of any the data coincidence, a turbine stage fabricated according to the modeling will have turbine blades which are at least substantially free of harmonically resonant vibration at the discrete rotation speeds of the turbocharger (Abstract, L7-15; Page 1, CL1, Para 2, L1-10; Page 1, CL1, Para 3, L1-5; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

7.15 As per Claim 18, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 17. **Garrett et al.** teaches fabricating the turbocharger, wherein the turbocharger is free of any the data coincidence (Page 1, Para 0007, Para 0009 and Para 0010; Page 2, Para 0023, L1-17; Para 0024, L14-22). **Garrett et al.** and **Rowe et al.** do not expressly teach fabricating the turbocharger according to the step of modeling, wherein the step of modeling is free of any the data coincidence. **Kaneko et al.** teaches fabricating the turbocharger according to the step of modeling, wherein the step of modeling is free of any the data coincidence (Abstract, L7-15;

Page 1, CL1, Para 2, L1-10; Page 1, CL1, Para 3, L1-5; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

7.16 As per Claim 19, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 17. **Garrett et al.** and **Kaneko et al.** do not expressly teach repeating the step of selecting the throttle settings, wherein at least one new throttle setting is selected. **Rowe et al.** teaches repeating the step of selecting the throttle settings, wherein at least one new throttle setting is selected (CL4, L58 to CL5, L4; Fig. 2; CL5, L49-57).

**Garrett et al.** and **Rowe et al.** do not expressly teach ascertaining there is an absence of any the data coincidence. **Kaneko et al.** teaches ascertaining there is an absence of any the data coincidence (Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

7.17 As per Claim 18, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 19. **Garrett et al.** teaches fabricating the turbocharger, wherein the turbocharger is free of any the data coincidence (Page 1, Para 0007, Para 0009 and Para 0010; Page 2, Para 0023, L1-17; Para 0024, L14-22). **Garrett et al.** and **Rowe et al.** do not expressly teach fabricating the turbocharger according to the step of modeling, wherein the step of modeling is free of any the data coincidence. **Kaneko et al.** teaches fabricating the turbocharger according to the step of modeling, wherein the step of modeling is free of any the data coincidence (Abstract, L7-15; Page 1, CL1, Para 2, L1-10; Page 1, CL1, Para 3, L1-5; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

8. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Garrett et al.** (U.S. Patent Application 2004/0101402) in view of **Rowe et al.** (U.S. Patent 5,887,419), and further in view of **Kaneko et al.** ("Reduction of vibratory stress of compressor blade by use of asymmetric vane spacing", Proceedings of the International Turbine Congress, November 2003) and **Berg** (U.S. Patent 4,657,476).

8.1 As per claim 10, **Garrett et al., Rowe et al.** and **Kaneko et al.** teach the method of claim 9. **Garrett et al., Rowe et al.** and **Kaneko et al.** do not expressly teach that the remodeling of the turbine nozzle vanes provides an odd, prime number of turbine nozzle vanes. **Berg** teaches that the remodeling of the turbine nozzle vanes provides an odd, prime number of turbine nozzle vanes (CL3, L3-9; CL4, L14-15). It would have been obvious to one of ordinary skill in the art at the time of Applicant's invention to modify the method of **Garrett et al., Rowe et al.** and **Kaneko et al.** with the method of **Berg** that included the remodeling of the turbine nozzle vanes provided an odd, prime number of turbine nozzle vanes, because that would provide more optimum turbine operating conditions for increased turbine efficiency (CL1, L43-45).

8.2 As per Claim 11, **Garrett et al., Rowe et al., Kaneko et al.** and **Berg** teach the method of claim 10. **Garrett et al.** teaches fabricating the turbocharger (Page 1, Para 0007, Para 0009 and Para 0010; Page 2, Para 0023, L1-17; Para 0024, L14-22). **Garrett et al., Rowe et al.** and **Berg** do not expressly teach comprising fabricating a turbocharger according to the repeating of the step of modeling. **Kaneko et al.** teaches comprising fabricating a turbocharger according to the repeating of the step of modeling (Abstract, L7-15; Page 1, CL1, Para 2, L1-10; Page 1, CL1,

Para 3, L1-5; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

8.3 As per Claim 12, **Garrett et al., Rowe et al., Kaneko et al.** and **Berg** teach the method of claim 11. **Garrett et al., Rowe et al.** and **Kaneko et al.** teach a turbocharger fabricated according to the method of Claim 11. **Garrett et al.** teaches fabricating the turbocharger (Page 1, Para 0007, Para 0009 and Para 0010; Page 2, Para 0023, L1-17; Para 0024, L14-22). **Garrett et al., Rowe et al.** and **Berg** do not expressly teach fabricating the turbocharger according to the step of modeling. **Kaneko et al.** teaches fabricating the turbocharger according to the step of modeling (Abstract, L7-15; Page 1, CL1, Para 2, L1-10; Page 1, CL1, Para 3, L1-5; Page 1, CL2, Para 2, L6-8; Page 2, Fig. 1; Page 2, CL1, Para 2 to Page 5, CL1, Para 1).

## ***Conclusion***

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kandasamy Thangavelu whose telephone number is 571-272-3717. The examiner can normally be reached on Monday through Friday from 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez, can be reached on 571-272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to TC 2100 Group receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

K. Thangavelu
Art Unit 2123
September 26, 2006